ATTO Technology, Inc.

ATTO FastFrame Converged Network Adapter Installation and Operation Manual

FastFrame CS11

10GbE Single Port PCIe 2.0 Converged Network Adapter

FastFrame CS12

10GbE Dual Port PCIe 2.0 Converged Network Adapter

FastFrame CS14

10GbE Quad Port PCIe 2.0 Converged Network Adapter

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1 ATTO FastFrame CNA Features & Overview

The ATTO FastFrame CNA family of high performance I/O connectivity products provide connectivity, intelligence and scalability.

Intel's ubiquitous Ethernet Platform united with ATTO Fibre Channel Expertise

Intel's Ethernet platform is one of the most widely deployed in the world, and provides simple, tested usability. FastFrame™ CNAs combine this with ATTO's Fibre Channel expertise, including Advanced Data Streaming (ADS™), which eliminates peaks and drops to smooth data transfer for latency-sensitive applications. Together, these are extensively tested and optimized by ATTO for high performance in demanding, low-latency applications such as content creation, streaming media, and others with similar profiles such as medical imaging and oil & gas.

Low power consumption

FastFrame™ draws up to 60% less power than competing solutions. A lower power rating means lower energy costs, lower data center maintenance fees, and less heat to dissipate.

Full range of products for flexible design

FastFrame's comprehensive, easy-to-understand portfolio includes single-, dual-, and quad-port adapters with included high-quality SFP+ connectors (a hidden cost with competitor cards) and support for direct attach copper. Quad-port adapters allow for flexible design in systems with minimal available PCIe slots. Ports may be individually configured for Ethernet file access, iSCSI, or FCoE converged networking. Evolve your storage/data-intensive network connectivity without “forklift upgrades.”

Getting started

In general, to install the ATTO Converged Network Adapter, you must:

1 Ensure you have the equipment and software you need for the installation:
   - FastFrame CNA
   - ATTO FastFrame CNA CD including drivers, user manuals and utilities (Installation CD)
   - A computer with an available expansion slot
   - Storage, cables and connectors

2 Install drivers from the Installation CD for your operating system. Refer to Driver Installation on page 6.

3 Install the configuration software, the ATTO ConfigTool, found on the Installation CD. For more information on how to use the ATTO ConfigTool, refer to the ATTO Utilities Installation and Operation Manual.

4 Install the FastFrame Adapter. Refer to Hardware Installation on page 8.

5 Attach your CNA to a switch using an ATTO recommended cable:
   - CBL-LCLC-R03 (3 Meter)
   - CBL-LCLC-R10 (10 Meter)

6 If required, configure your FastFrame adapter using the ATTO ConfigTool.

Note

Default settings are appropriate for most systems but you may change settings using the ATTO ConfigTool.

FastFrame CS14 Adapter

ATTO FastFrame™ CNAs allow customers to save time and money by using a single network to run both Fibre Channel SAN traffic and Ethernet general file system/application traffic on the same lossless network. FastFrame enables connectivity solutions ranging from high-performance access to file servers, through connection to industry-leading NAS systems, to switched fully-converged FCoE topologies, without expensive upgrades, add-ons, or hidden costs. Backwards compatible (via auto-negotiation) for phased upgrade to 10Gb Ethernet, FastFrame CNAs are built with ATTO's industry-leading Fibre Channel stack, and simultaneously support TCP/IP, iSCSI, and FCoE, which may be configured per-port. Data Center Bridging (DCB) provides traffic prioritization - required for high quality of service for iSCSI, and for running FCoE converged SANs. Quad-port adapters conserve PCIe slots for more flexible system design.

Technical specifications

- Simultaneously supports multiple networking and storage protocols: FCoE, TCP/IP, iSCSI
- 400,000 IOPs per port delivers high-throughput for critical applications
- Supports Data Center Bridging; Priority-based Flow Control (PFC), Enhanced Transmission Selection (ETS) and DCB Exchange (DCBX) protocol
- Up to 10Gb/s throughput per port
- High-performance x8 PCIe 2.0 bus

Ethernet features

- Data rate per port: 10Gb/s
- Jumbo frame support up to 9,000 bytes
- Tx/Rx IP, TCP & UDP checksum offloading (IPv4, IPv6) capabilities, Transmission control protocol (TCP), User datagram protocol (UDP), Internet protocol (IP)
- Large send offloads (LSO)

FCoE features

- Concurrent Logins 2048
- Active Exchanges/port 2048
- FC Class 3 support
- Protocol - FCP (SCSI-FCP)
- 400,000 IOPS per port
- FC-FDMI
- FC-GS-2/3/4
- FC-FS
- FCoE Initialization Protocol (FIP) Version 1
- Support for FC-BB-6, including VN2VN
- Target Mode

Host bus specifications

- x8 mechanical and x8 electrical PCI Express interconnect
- Conforms to PCI Express Base Spec 2.0
- Conforms to PCI Express CEM Spec 2.0
- PCI Hot Plug spec 1.0

Environmental & physical specifications

- Length: 6.3 inches
- Height: 4.08 inches
- Operating temperature: 0 to 55 ºC (32 to 131 ºF)
- Storage temperature: -40 to 70 ºC (-40 to 158 ºF)
- Relative humidity: 10 to 90% non-condensing
- 15.7 W (typical)
- 100 lf/m (minimum) airflow recommended
- RoHS compliant

External connectivity

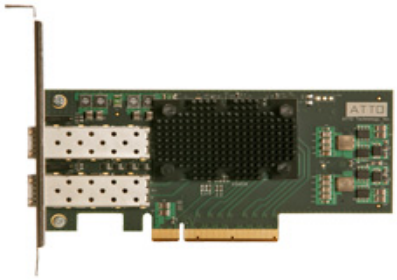
- Easy to install full height connection bracket
- External LEDs for on-line and speed status for each port
- Four pluggable optical LC SFP+ modules included

Software specifications

- Microsoft Windows Vista®, 7®, 8®
- Microsoft Windows Server® 2008, 2008 R2, 2012
- Mac OS® X 10.6, 10.7, 10.8
- Red Hat Enterprise Linux® 5.x, 6.x
- SUSE Linux Enterprise® Server 11, 11 SP1, 11 SP2
- openSUSE™ 11.3, 11.4
- CentOS 6

FastFrame CS12 Adapter

ATTO FastFrame™ CNAs allow customers to save time and money by using a single network to run both Fibre Channel SAN traffic and Ethernet general file system/application traffic on the same lossless network. FastFrame enables connectivity solutions ranging from high-performance access to file servers, through connection to industry-leading NAS systems, to switched fully-converged FCoE topologies, without expensive upgrades, add-ons, or hidden costs. Backwards compatible (via auto-negotiation) for phased upgrade to 10Gb Ethernet, FastFrame CNAs are built with ATTO's industry-leading Fibre Channel stack, and simultaneously support TCP/IP, iSCSI, and FCoE, which may be configured per-port. Data Center Bridging (DCB) provides traffic prioritization - required for high quality of service for iSCSI, and for running FCoE converged SANs. Dual-port adapters support redundancy and link aggregation for higher throughput.



Technical specifications

- Simultaneously supports multiple networking and storage protocols: FCoE, TCP/IP, iSCSI
- 400,000 IOPs per port delivers high-throughput for critical applications
- Supports Data Center Bridging; Priority-based Flow Control (PFC), Enhanced Transmission Selection (ETS) and DCB Exchange (DCBX) protocol
- Up to 10Gb/s throughput per port
- High-performance x8 PCIe 2.0 bus

Ethernet features

- Data rate per port: 10Gb/s
- Jumbo frame support up to 9,000 bytes
- Tx/Rx IP, TCP & UDP checksum offloading (IPv4, IPv6) capabilities, Transmission control protocol (TCP), User datagram protocol (UDP), Internet protocol (IP)
- Large send offloads (LSO)

FCoE features

- Concurrent Logins 2048
- Active Exchanges/port 2048
- FC Class 3 support
- Protocol - FCP (SCSI-FCP)
- 400,000 IOPS per port
- FC-FDMI
- FC-GS-2/3/4
- FC-FS
- FCoE Initialization Protocol (FIP) Version 1
- Support for FC-BB-6, including VN2VN
- Target Mode

Host bus specifications

- x8 mechanical and x8 electrical PCI Express interconnect
- Conforms to PCI Express Base Spec 2.0
- Conforms to PCI Express CEM Spec 2.0
- PCI Hot Plug spec 1.0

Environmental & physical specifications

- Length: 5.3 inches
- Height: 2.345 inches
- Operating temperature: 0 to 55 ºC (32 to 131 ºF)
- Storage temperature: -40 to 70 ºC (-40 to 158 ºF)
- Relative humidity: 10 to 90% non-condensing
- 5.9 W (typical)
- 100 lf/m (minimum) airflow recommended
- RoHS compliant

External connectivity

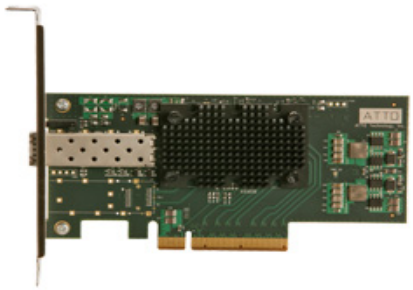
- Easy to install full height connection bracket; low-profile bracket included in finished goods packaging
- External LEDs for on-line and speed status for each port
- Two pluggable optical LC SFP+ modules included

Software specifications

- Microsoft Windows Vista®, 7®, 8®
- Microsoft Windows Server® 2008, 2008 R2, 2012
- Mac OS® X 10.6, 10.7, 10.8
- Red Hat Enterprise Linux® 5.x, 6.x
- SUSE Linux Enterprise® Server 11, 11 SP1, 11 SP2/openSUSE™ 11.3, 11.4/CentOS 6

FastFrame CS11 Adapter

ATTO FastFrame™ CNAs allow customers to save time and money by using a single network to run both Fibre Channel SAN traffic and Ethernet general file system/application traffic on the same lossless network. FastFrame enables connectivity solutions ranging from high-performance access to file servers, through connection to industry-leading NAS systems, to switched fully-converged FCoE topologies, without expensive upgrades, add-ons, or hidden costs. Backwards compatible (via auto-negotiation) for phased upgrade to 10Gb Ethernet, FastFrame CNAs are built with ATTO's industry-leading Fibre Channel stack, and simultaneously support TCP/IP, iSCSI, and FCoE, which may be configured per-port. Data Center Bridging (DCB) provides traffic prioritization - required for high quality of service for iSCSI, and for running FCoE converged SANs. Single-port adapters provide affordable high performance and the lowest power utilization.



Technical specifications

- Simultaneously supports multiple networking and storage protocols: FCoE, TCP/IP, iSCSI
- 400,000 IOPs per port delivers high-throughput for critical applications
- Supports Data Center Bridging; Priority-based Flow Control (PFC), Enhanced Transmission Selection (ETS) and DCB Exchange (DCBX) protocol
- Up to 10Gb/s throughput per port
- High-performance x8 PCIe 2.0 bus

Ethernet features

- Data rate per port: 10Gb/s
- Jumbo frame support up to 9,000 bytes
- Tx/Rx IP, TCP & UDP checksum offloading (IPv4, IPv6) capabilities, Transmission control protocol (TCP), User datagram protocol (UDP), Internet protocol (IP)
- Large send offloads (LSO)

FCoE features

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- FC Class 3 support
- Protocol - FCP (SCSI-FCP)
- 400,000 IOPS per port
- FC-FDMI
- FC-GS-2/3/4
- FC-FS
- FCoE Initialization Protocol (FIP) Version 1
- Support for FC-BB-6, including VN2VN
- Target Mode

Host bus specifications

- x8 mechanical and x8 electrical PCI Express interconnect
- Conforms to PCI Express Base Spec 2.0
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Environmental & physical specifications

- Length: 5.3 inches
- Height: 2.345 inches
- Operating temperature: 0 to 55 ºC (32 to 131 ºF)
- Storage temperature: -40 to 70 ºC (-40 to 158 ºF)
- Relative humidity: 10 to 90% non-condensing
- 4.7 W (typical)
- 100 lf/m (minimum) airflow recommended
- RoHS compliant

External connectivity

- Easy to install full height connection bracket; low-profile bracket included in finished goods packaging
- External LEDs for on-line and speed status for each port
- Pluggable optical LC SFP+ module included

Software specifications

- Microsoft Windows Vista®, 7®, 8®
- Microsoft Windows Server® 2008, 2008 R2, 2012
- Mac OS® X 10.6, 10.7, 10.8
- Red Hat Enterprise Linux® 5.x, 6.x
- SUSE Linux Enterprise® Server 11, 11 SP1, 11 SP2
- openSUSE™ 11.3, 11.4/CentOS 6

Selection guide: FastFrame CS adapters

Product Features	FFRM-CS14	FFRM-CS12	FFRM-CS11
Ports	4	2	1
Maximum Transfer Rate (Full Duplex)	8GB/s	5GB/s	2.5GB/s
Bus type	PCIe 2.0	PCIe 2.0	PCIe 2.0
Bus characteristics	8 lane	8 lane	8 lane
Optical interface	SFP+LC	SFP+LC	SFP+ LC
Maximum cable length	See Chart Below	See Chart Below	See Chart Below
Low profile form factor		✓	✓
Advanced Data Streaming (ADS™) Technology	✓	✓	✓
Windows driver support	✓	✓	✓
Mac OS X driver support	✓	✓	✓
Linux driver support	✓	✓	✓

Cable length varies by interface and cable type.

Interface	Cable type	Max Distance
10GBASE-SR	62.5/125 µm multi-mode fiber (OM1)	33m
10GBASE-SR	50/125 µm MMF (OM2)	82m
10GBASE-SR	Laser optimized 50/125 µm MMF (OM3)	300m

2 Driver Installation

Before installing your FastFrame adapter, you must configure your system to recognize it by installing drivers for your operating system.

Note

If you already have one or more FastFrame adapters installed and you are installing additional adapter(s), you do not need to perform any of these procedures unless you are updating a previously installed driver.

The Installation CD automatically starts when inserted in the system CD-ROM drive. Navigate the easy-to-use HTML-based menu to find the driver for your adapter and operating system.

The FastFrame CNA Installation CD, referred to in these instructions, is the Installation CD that shipped with your adapter or a folder containing the latest downloaded and expanded driver. We strongly recommend downloading the latest drivers, available at http://www.attotech.com/downloads.html

Windows

Note

Windows 8, 7, Vista, Server 2012 and 2008 may utilize a new User Account Control Feature. Because of this there may be additional confirmations that will need to be performed to properly install the driver. These confirmations normally consist of a dialog where the user has to give Windows permission to perform an action. If you do not have the correct privileges during this, you will be prompted for an actual user name and password. You may need to contact your system administrator if you do not have this information.

1. Power on your system and log in as the administrator or a user with proper administrative privileges.
2. Insert the Installation CD. The ATTO Installation CD guide should appear. If not, navigate to the root of the CD and run the **AUTORUN.BAT** batch file.
3. Click on **Windows Driver**.
4. Click **Install Windows Driver** next to the appropriate item to initiate the driver setup program.
5. Follow the on-screen instructions to complete the driver installation.
6. The installer will also create **"Network Adapter"** devices for each FastFrame port. You can configure these Network Adapters through the **Network Connections** control panel.

Mac OS X

1. Power on your system and log in as the administrator or a user with proper administrative privileges.
2. Insert the Installation CD.
3. After the CD mounts, open the FastFrame volume on the desktop.
4. Open the Drivers folder.
5. Open the folder corresponding to the OS X version in use.
6. Launch the installer package.
7. Follow the on-screen instructions.

Linux

Note

These steps assume a basic knowledge of Linux terminal commands. You must also have the correct kernel header files for the appropriate kernel already installed.

1. Power on your system and log in as the administrator or a user with proper administrative privileges.
2. Insert the Installation CD.
3. After the CD mounts, open the FastFrame volume on the desktop.
4. Open the **Linux** folder.
5. Open the **Drivers** folder.
6. Open the folder corresponding to the speed of the HBA.

7 Copy the .tgz file to a temporary folder.

8 Open a terminal window and change to the location of copied tgz.

9 Extract the file using the command **tar -xfz <filename.tgz>**.

10 Change to the directory created above then run the installer script **./install.sh**.

11 The install script will ask if you want the FastFrame 10 GbE (ffxgbe) network adapter installed. If you wish to enable network traffic on a FastFrame port, the ffxgbe driver should be installed. The ffxgbe driver can be configured with the ethtool utility.

3 Hardware Installation

Install the ATTO FastFrame Adapter and attach your devices to it using the instructions below. A basic understanding of Fibre Channel over Ethernet is recommended, before attempting to install the FastFrame CNA.

CAUTION

Back up your system data before changing or installing any hardware.

System requirements

The FastFrame CNA package contains the following:

- FastFrame Converged Network Adapter
- ATTO Utilities CD
- SFP+ Modules

If any of these items are missing, contact your ATTO authorized sales representative.

To install and use the FastFrame CNA you will need:

1 A computer with an available PCI Express expansion slot
2 The complete FastFrame CNA package

MAC address

FastFrame CNAs are configured with a unique MAC address designated by the Institute of Electrical and Electronic Engineers. This address, stored in flash memory, allows the system to recognize the FastFrame CNA as a unique part of your configuration. The address is clearly marked on the back of the adapter.

The MAC address assigned to an adapter is assigned to the 1st port of the adapter. If the adapter has more than one port then the MAC address is incremented by and assigned to the 2nd port, incremented by 2 and assigned to the 3rd port and incremented by 3 and assigned to the 4th port.

The assignment will be as follows:

MAC address	1st port of CS11, CS12 & CS14
MAC address + 1	2nd port of CS12 & CS14
MAC address + 2	3rd port of CS14
MAC address + 3	4th port of CS14

Installation

CAUTION

FastFrame CNA contain components that are sensitive to electrostatic discharge (ESD). ESD can cause damage to the FastFrame CNA host adapter. Please follow standard methods to avoid ESD.

For bracket installation, please see the bracket installation guide included in your CNA product package.

1 Install the latest drivers. Refer to Chapter 2 on page 6.
2 Power down the computer and unplug the computer from all power sources.
3 Open the case.
4 Install the FastFrame CNA host adapter in any open PCI Express expansion slot. If you have questions about how to install an expansion card in your system, consult your computer's documentation.

Note

The FastFrame adapters fit into x8 or x16 mechanical PCI Express slots.

5 Connect the FastFrame to a network by:
   a. Inserting an optical 10Gb cable into a connector on the FastFrame CNA host adapter until you hear a click.
   b. Connect other end of the cable to a 10GbE switch with DCB (for VN2VN), or Fibre Channel Forwarding (FCF).
6 Close the case on the computer and power it up.

Bracket details

Exhibit 3-1 FFRM-CS14 Bracket

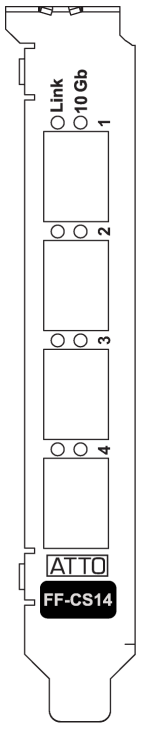


Exhibit 3-2 FFRM-CS12 Full & Low Profile Bracket

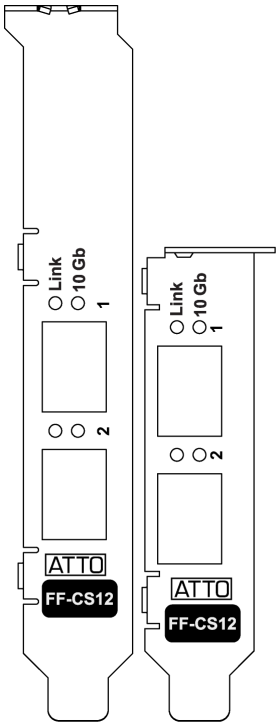
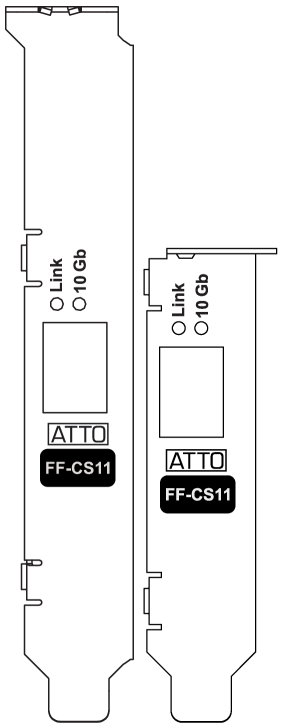


Exhibit 3-3 FFRM-CS11 Full & Low Profile Bracket



Adapter board details

Exhibit 3-4 FFRM-CS14 board

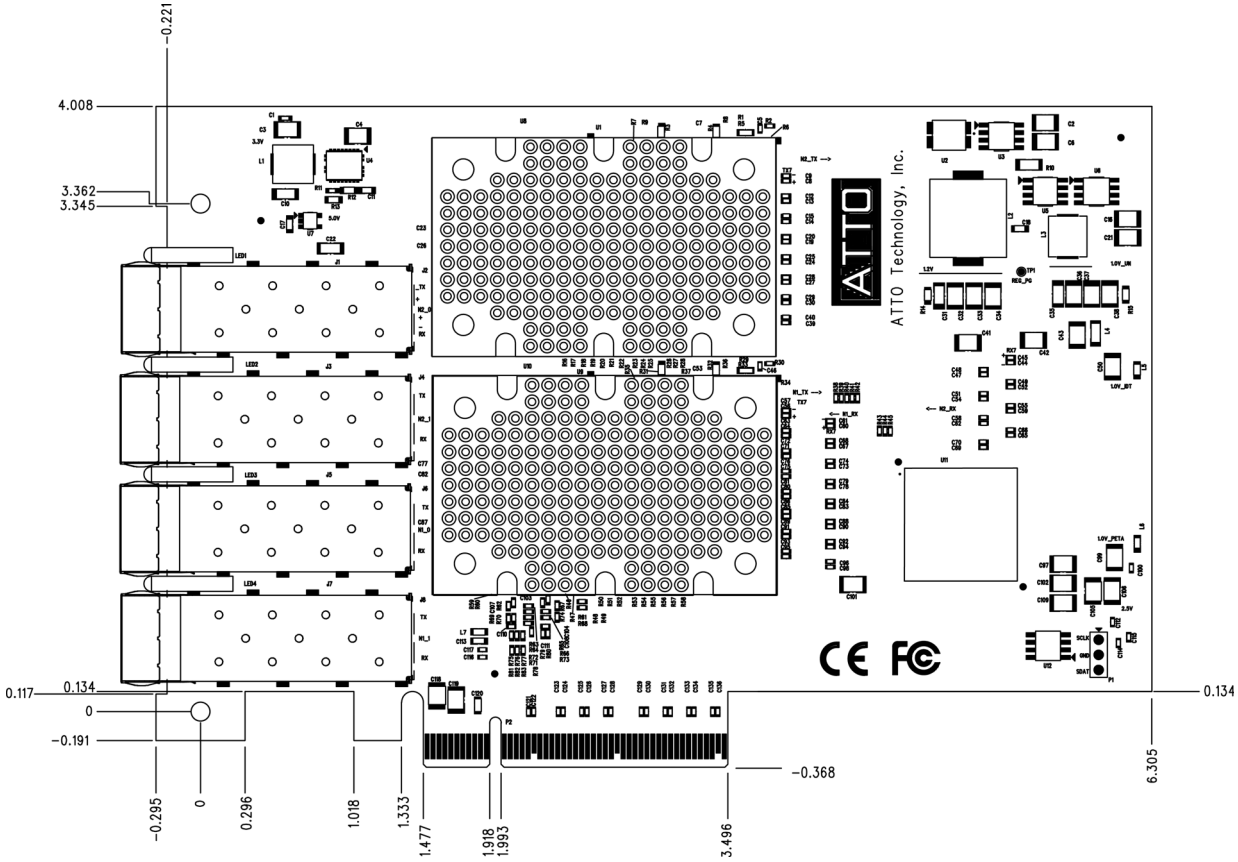


Exhibit 3-5 FFRM-CS12 board

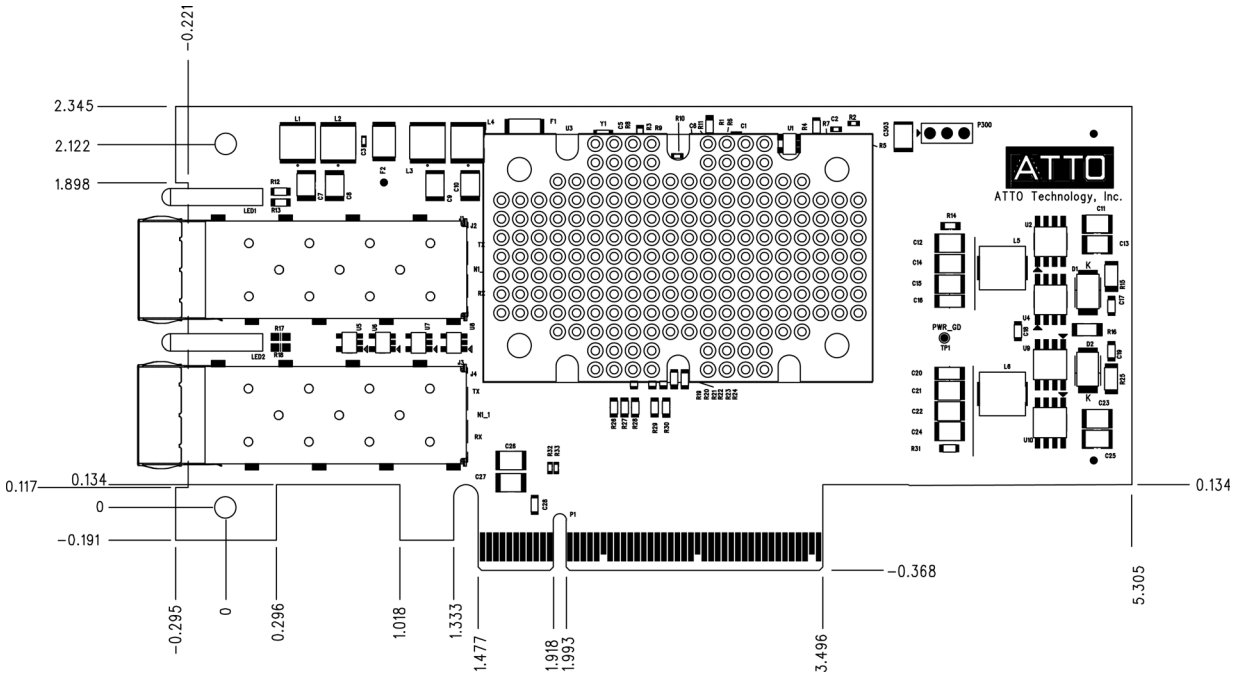
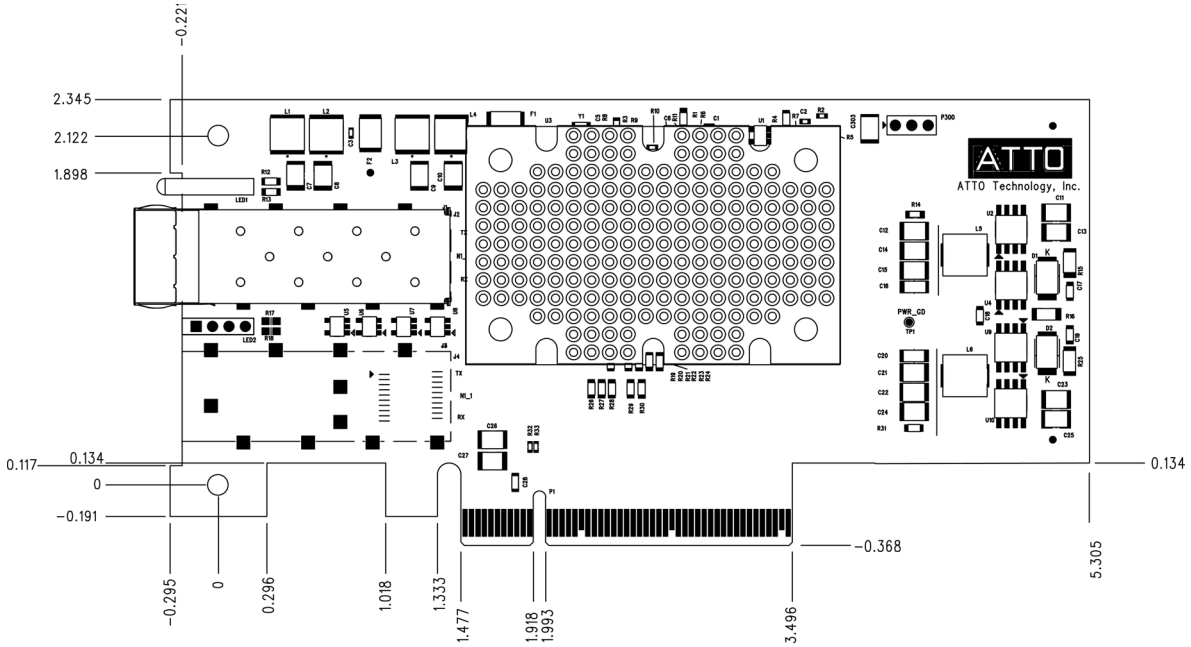


Exhibit 3-6 FFRM-CS11 board



4 FastFrame Link Aggregation

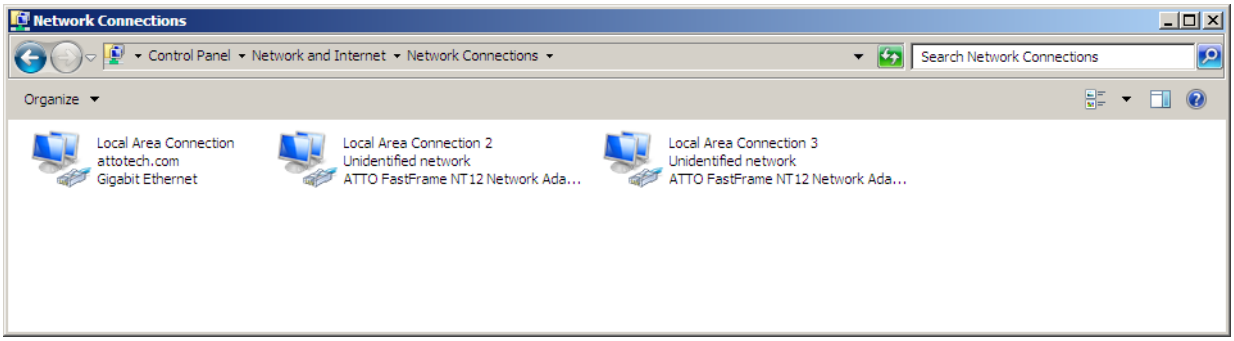
FastFrame Link Aggregation allows multiple FastFrame 10GbE links to be combined into one logical link, for the purpose of increasing performance. This feature applies to Windows Vista, 7, 8, Server 2008, 2008 R2 and 2012 for all ATTO FastFrame models. Note: although FastFrame link aggregation does support Server 2012 it is recommended you use Teaming; Windows built-in link aggregation.

Installing FastFrame Link Aggregation

The FastFrame Link Aggregation driver consists of a Protocol driver and associated configuration components. It is installed on the system along with the FastFrame drivers. To use link aggregation, the protocol driver must be installed on the FastFrame Network Adapters.

1 Open the system's Network Connections control panel, as shown in 4-1:

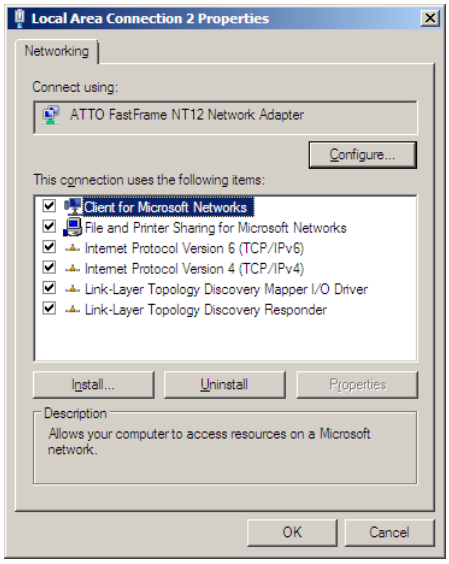
Exhibit 4-1 Windows Network Connection Control Panel



2 Right-click on an ATTO FastFrame Network Adapter connection and select **Properties** to open the Network Connection Properties page, shown below.

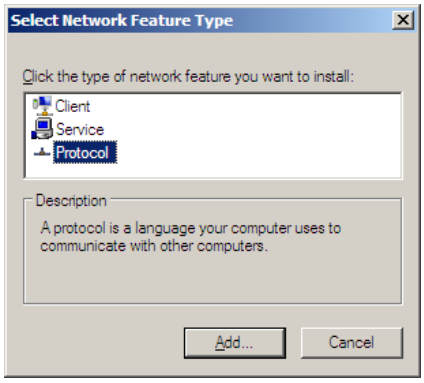
3 Click **Install**

Exhibit 4-2 FastFrame Network Connection Properties



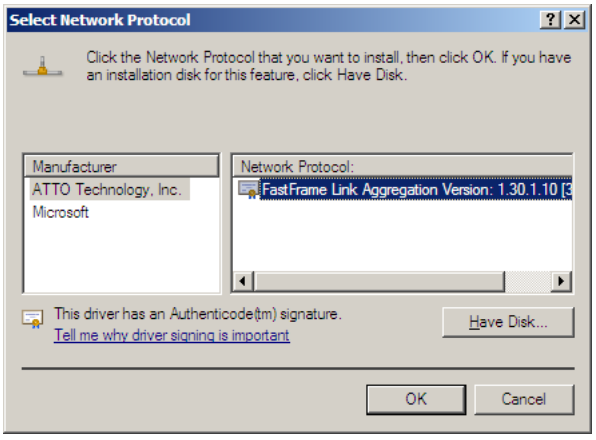
4 Select **Protocol** and click **Add**

Exhibit 4-3 Network Feature Type Selection



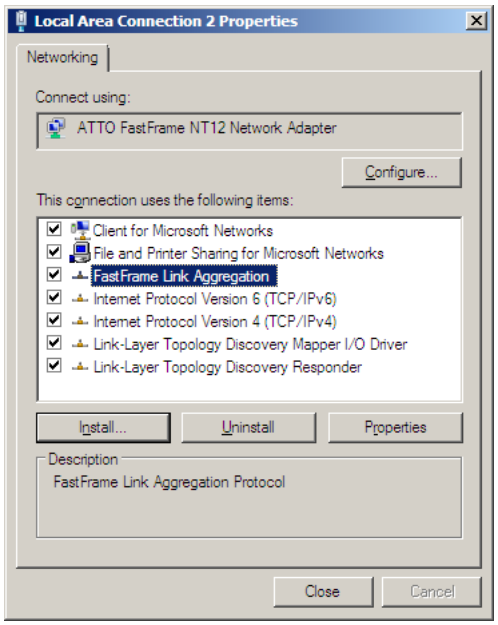
5 Select **FastFrame Link Aggregation** and click **OK** as shown in 4-4.

Exhibit 4-4 Select Protocol to install


Select Network Protocol
Click the Network Protocol that you want to install, then click OK. If you have an installation disk for this feature, click Have Disk.
Manufacturer
ATTO Technology, Inc.
Microsoft
Network Protocol:
FastFrame Link Aggregation Version: 1.30.1.10
This driver has an Authenticode(tm) signature.
Tell me why driver signing is important
Have Disk...
OK
Cancel

6 FastFrame Link Aggregation is now installed and ready to configure.

Exhibit 4-5 FastFrame Network Connection Properties (with Link Aggregation installed)



Configuring Link Aggregation

The ATTO FastFrame Link Aggregation user interface uses the following terminology:

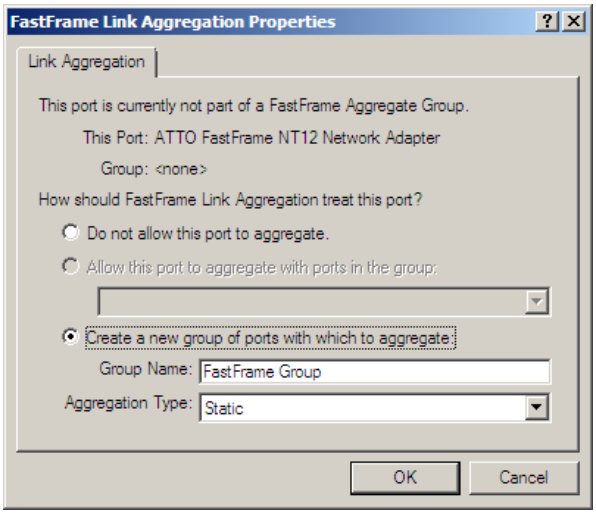
- **Port** - A port is a single ethernet connection on a network adapter. Only ports on FastFrame Ethernet adapters can participate in FastFrame link aggregation.
- **Aggregate Group** - A set of Ports which are configured to aggregate with each other. “Group” also refers to the Windows Network Connection object that represents the aggregated links.

Opening the FastFrame Link Aggregation Properties Page

1 Open the Network Connection Properties page for one of the FastFrame adapters as shown in 4-5.

2 Select **FastFrame Link Aggregation** and click **Properties**. As shown in 4-6, the FastFrame Link Aggregation Properties page displays:
   - The name of the port
   - The name of the group that this port is a member of. If aggregation is not enabled for this port, the group will be **<none>**.
   - Controls to configure link aggregation for this port. The controls allow this port to be added to and removed from an aggregate group.

Exhibit 4-6 FastFrame Link Aggregation Properties Page


FastFrame Link Aggregation Properties
Link Aggregation
This port is currently not part of a FastFrame Aggregate Group.
This Port: ATTO FastFrame NT12 Network Adapter
Group: <none>
How should FastFrame Link Aggregation treat this port?
Do not allow this port to aggregate.
Allow this port to aggregate with ports in the group:
Create a new group of ports with which to aggregate
Group Name: FastFrame Group
Aggregation Type: Static
OK
Cancel

Configuring a Group's Operational Settings

A FastFrame aggregate group derives most of its operational settings, such as Offloads and jumbo packets, automatically, based on the settings of the network adapters in the group. Therefore, in order for a feature to be in effect for a group, that feature must be set identically on each member adapter. For example, to enable jumbo packets for a group, enable Jumbo Packets (by selecting the same jumbo packet size, such as 9014) on each adapter. Likewise, in order to disable checksum offloads, checksum offloads must be disabled for each adapter.

Note

For best results, configure the settings on each individual member adapter before creating the group containing those adapters.

CAUTION

Having adapters with mismatched configuration settings can lead to loss of connectivity and/or network I/O errors. To ensure proper operation, each of the underlying adapters in a group must be configured the same.

Note

Reconfiguring an aggregate group - adding or removing a port, or making certain changes to a member adapter's operational settings - will result in momentary loss of the group's network connection.

After reconfiguration of FastFrame aggregate groups, it may be necessary to reboot the system in order for changes to be applied completely

Creating an Aggregate Group

1. Open the FastFrame Link Aggregation Properties page for one of the FastFrame adapters that is to be included in the new group as shown in 4-6.
2. Select the option to Create a new group of ports
3. Enter a name for the group and click **OK**.
4. Select the type of link aggregation to use. Currently only Static aggregation is supported.
5. Click **OK**.

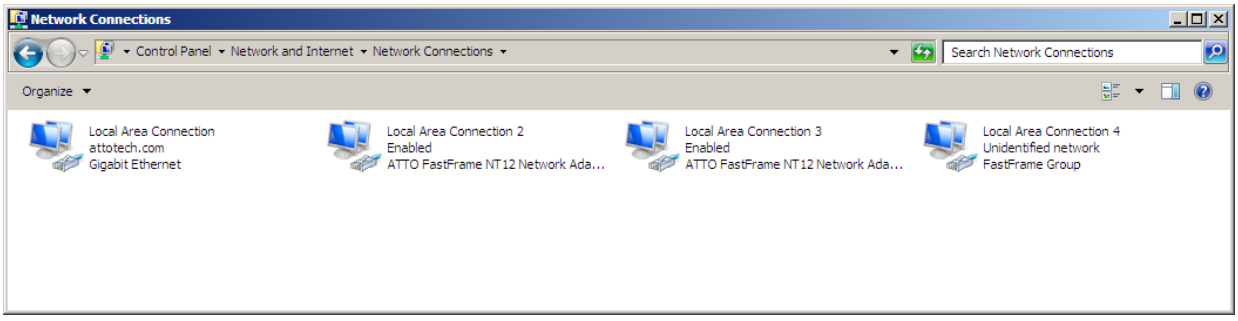
Note

The Group will be given the MAC address of the first adapter added to the group.

Note

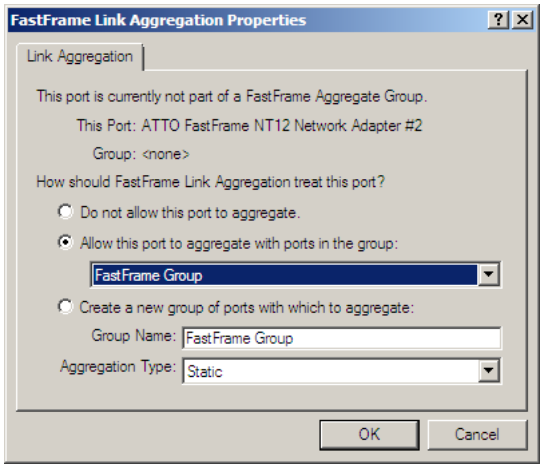
As shown in 4-7, the group will appear in the Network Connections list and operate similarly to any other network connection.

Exhibit 4-7 Network Connections (with a FastFrame Group)



Adding a Port to a Group

Exhibit 4-8 Adding a Port to a Group


FastFrame Link Aggregation Properties
Link Aggregation
This port is currently not part of a FastFrame Aggregate Group.
This Port: ATTO FastFrame NT12 Network Adapter #2
Group: <none>
How should FastFrame Link Aggregation treat this port?
Do not allow this port to aggregate.
Allow this port to aggregate with ports in the group:
FastFrame Group
Create a new group of ports with which to aggregate:
Group Name: FastFrame Group
Aggregation Type: Static
OK
Cancel

1 Open the FastFrame Link Aggregation Properties page for the FastFrame adapter that is to be added to the group.
2 Select **Allow this port to aggregate with ports in the group**
3 Select the group in the list.

Note

If only one group has been created, it will be the only entry in the list and will be selected automatically.

4 Select the type of link aggregation to use.

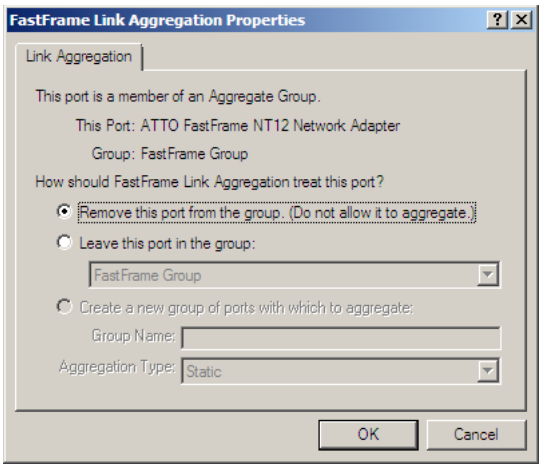
Note

Currently only Static aggregation is supported, which will be selected automatically.

5 Click **OK**.
6 Repeat this process for each port that is to be added to the group.

Removing a Port from a Group

Exhibit 4-9 Removing a Port from a group


FastFrame Link Aggregation Properties
Link Aggregation
This port is a member of an Aggregate Group.
This Port: ATTO FastFrame NT12 Network Adapter
Group: FastFrame Group
How should FastFrame Link Aggregation treat this port?
Remove this port from the group. (Do not allow it to aggregate.)
Leave this port in the group:
FastFrame Group
Create a new group of ports with which to aggregate:
Group Name:
Aggregation Type: Static
OK
Cancel

1 Open the FastFrame Link Aggregation Properties page for the FastFrame adapter that is to be removed from the group.
2 Select **Remove this port from the group**.
3 Click **OK**.

Note

The port is removed from the group, and will no longer aggregate with any of the ports in the group. This effectively disables FastFrame link aggregation for this adapter. If there are no other ports remaining in the group, the group itself will be removed and deleted from the system.

Removing a Group

To remove a group:

1 Remove each of the adapters from the group. Upon removal of the last adapter in the group, the group will be removed from the system

Uninstalling Link Aggregation

To remove FastFrame Link Aggregation:

1 Open the Properties for any FastFrame Network Connection.
2 Select **FastFrame Link Aggregagtion.**
3 Click **Uninstall**.

5 Updating Drivers

Your FastFrame CNA ships with the latest flash and drivers, but these may need to be updated as new versions become available. Visit the ATTO website, www.attotech.com, to download the latest drivers and flash bundle.

Updating drivers

Update drivers by downloading the latest driver software from the ATTO Technology website.

1 Go to www.attotech.com
2 Click on **downloads**.
3 Register or log in if previously registered.
4 Click on **Ethernet Adapters** in the left dialog.
5 Navigate to your HBA model/family in the right dialog and click on it.
6 Scroll down to and click the desired driver depending on the operating system.
7 A download window appears. Choose **Save**.
8 After the download has completed, process the downloaded file:
    - On Windows, run the downloaded **.exe** file.
    - On Mac OS X, mount the dmg file, then double click on the installer icon.
    - On Linux, expand the **.tgz** file, then run the **install.sh** installation script.
9 Follow the instructions for installing the drivers.

Updating the ATTO ConfigTool

If you want the latest version of the ATTO ConfigTool, download it from the ATTO website.

1 Go to www.attotech.com
2 Click on **downloads**.
3 Register or log in if previously registered.
4 Click on **Ethernet Adapters** in the left dialog.
5 Navigate to your HBA model/family in the right dialog and click on it.
6 Scroll down to and click the desired ATTO ConfigTool depending on the operating system.
7 A download window appears. Choose **Save**.
8 After the download has completed, process the downloaded file:
    - On Windows, run the downloaded **.exe** file.
    - On Mac OS X, mount the dmg file, then double click on the installer icon.
    - On Linux, expand the **.tgz** file, then run the .bin installer application.
9 Follow the instructions for installing the application.
10 To use the tool, refer to the **ATTO Utilities Installation and Operation Manual** which may be downloaded from the ATTO website.
    a. Go to **www.attotech.com**.
    b. Click on **downloads**.
    c. Register or log in if previously registered.
    d. Click on Ethernet Adapters in the left dialog.
    e. Navigate to your HBA model/family in the right dialog and click on it.
    f. Click the **Utility Manual (.pdf) link** to save/open the document.

6 Troubleshooting

This chapter contains solutions for the most common problems you might encounter. If you need additional assistance, please refer to the ATTO Technology website, www.attotech.com, or contact an authorized ATTO Technology representative.

General suggestions

- Check each cable connection on every device.
- Verify all cables are in proper working condition. Loose or broken cables are often the cause of errors or problems.

Windows

- All of the external devices connected to the CNA should be identified. If they do not appear in the Device Manager, the external devices or connection may not be working properly.
- If the FastFrame FCoE Adapter does not appear under the SCSI and RAID controllers:
  a. Remove power from the PC.
  b. Open the case.
  c. Check that the FastFrame CNA adapter is properly seated in the PCIe slot.
  d. Replace the case and apply power.
- If the adapter has been identified but there is an exclamation point (!) on the listing:
  a. Right click on the listing and select Uninstall.
  b. Reload the driver (see Updating drivers on page 16.
  c. Reboot the system and repeat the installation process.

If problems persist, contact your authorized ATTO Technology representative.

Linux

1 Verify the FastFrame driver is loaded with the lsmod command. If lsmod does not show the driver, refer to the installation instructions to install and load the driver in Updating drivers on page 16.

2 Check the system log with the command dmesg. The FastFrame driver creates status messages during initialization. Make sure that all installed cards are properly detected and initialized.

3 Examine the contents of the file(s): /proc/scsi/fastframe/x, where x is the adapter's host number. This file contains details such as link status, connection speed and discovered devices.

Note

*Advanced users only. Modify the **driver makefile** to enable debugging information. Upon loading, the **FastFrame driver** displays detailed debugging information which may help troubleshoot the problem.*

Mac OS X

Note

The ATTO FastFrame supports Mac OS X versions 10.6.x, 10.7.x, 10.8.x.

1 If the adapter does not appear in the System Profiler (10.6) / System Information (10.7/8), make sure the card is seated properly in the PCIe slot.
   a. Shut down and remove power from the Mac.
   b. Remove the side of the case.
   c. Check the PCIe slot
   d. Replace the side of the case.
   e. Apply power

Note

If the Fastframe adapter is properly seated and devices are still not accessible check the optical cable to verify your getting link light. If not contact an authorized ATTO representative.

2 Open the ATTO ConfigTool from the ATTO Utilities CD or download it from the ATTO website. Refer to the ATTO Utilities Installation and Operations Manual for additional information.

3 Verify the driver is loaded.
   a. Click on the adapter name in the Device Listing to view the Basic Info screen.
   b. If the Driver Information section indicates Unknown: driver not loaded, reinstall the driver. Refer to "Driver Installation" on page 6. If reinstalling the driver does not fix the problem, contact an authorized ATTO representative.

4 Reset the NVRAM for all channels to defaults and reboot. If the problem persists, contact an authorized ATTO representative.

Note

When calling ATTO Technical Support please have a printout of the IORegistry node of each controller, System Profiler (10.6) / System Information (10.7/8), MAC address of the adapter, and what driver and firmware.

Appendix A Glossary

Some terms used in the Fibre Channel industry are defined below. More information is available through the ATTO Technology website (www.attotech.com)*, the Fibre Channel Industry Association* (www.fibrechannel.com)*, Cern (*www.cern.ch)*, the Storage Area Networking Industry Association* (www.snia.org)*, and the Fibre Channel Consortium (*www.iol.unh.edu/consortiums, click on FC)*.*

Term	Definition
ANSI	American National Standards Institute
BER	Bit Error Rate: a measure of transmission accuracy; the ratio of bits received in error to bits sent
bit	smallest unit of data a computer can process: a single binary digit with a value of either 0 or 1
bus	a collection of unbroken signal lines used to transmit information from one part of a computer system to another; taps on the lines connect devices to the bus
byte	an ordered set of 8 bits
channel	a point-to-point link which transports data from one point to another
CPU	Central Processing Unit: the portion of the computer that actually performs computations
CRC	Cyclic Redundancy Check: an error-correcting code which calculates a numeric value for received and transmitted data; if no error has occurred during transmission, the CRC for both received and transmitted data should be the same
device driver	a program that allows a microprocessor to direct the operation of a peripheral device
DMA	Direct Memory Access: a way to move data from a storage device directly to RAM without using the CPU's resources
DMA bus master	allows a peripheral to control the flow of data to and from system memory by block as opposed to allowing the processor to control the data by bytes (PIO or programmed I/O)
fabric	a Fibre Channel switch of two or more Fibre Channel switches interconnected to physically transmit data between any two N_Ports on the switch or switches
FC	Fibre Channel
FCF	Fibre Channel Forwarder
FCoE	Fibre Channel over Ethernet
frame	an indivisible unit for transfer of information in Fibre Channel
frame header	the first field in the frame containing the address and other control information about the frame
full-duplex	a communication protocol which allows transmission in both directions at the same time
half duplex	a communication protocol which allows transmission in both directions, but only one direction at a time
host	a processor, usually a CPU and memory, which communicates with devices over an interface
initiator device	a component which originates a command
LED	Light-emitting diode: a type of diode that emits light when current passes through it; visible LEDs are used as indicator lights on all sorts of electronic devices
LUN	Logical Unit Number: an identifier for a logical unit (0-7)
MAC	Media Access Controller
MAC Address	A unique address assigned to an ethernet device
multi-mode fiber	an optical fiber which can carry several beams of light at once
N_port	a port attached to a node used with point to point or fabric configurations
originator	an initiating device; a component which originates a command
parity checking	a method which verifies the accuracy of data transmitted over the SCSI bus by adding one bit in the transfer to make the sum of all the bits either odd or even (for odd or even parity); an error message occurs if the sum is not correct

Term	Definition
PCI	Peripheral Component Interconnect. Allows peripherals to be connected directly to computer memory, bypassing the slower ISA and EISA busses
point-to-point	a topology where two ports communicate
port	an access point in a device: see N_port, NL_port, etc.
port address	also port number; the address, assigned by the PCI bus, through which commands are sent to a host adapter board
port number	see port address
receiver	the ultimate destination of data transmission; a terminal device
scatter/gather	a device driver feature which allows the host adapter to modify a transfer data pointer so that a single host adapter can access many segments of memory, minimizing interrupts and transfer overhead
SAS	Serial Attached SCSI: a serial SCSI bus technology and point to point architecture for connecting host bus adapters to storage devices
SATA	Serial AT Attachment: a serial ATA bus technology and point to point architecture for connecting host bus adapters to storage devices
scatter/gather	a device driver feature which allows the host adapter to modify a transfer data pointer so that a single host adapter can access many segments of memory, minimizing interrupts and transfer overhead
SCSI	Small Computer Systems Interface: a processor-independent standard for system-level interface between a computer and intelligent devices including hard disks, floppy disks, CD-ROM, printers, scanners, etc.
single-mode fiber	an optical fiber with a small core which supports one wavelength (ray of light); the core radius is nearly equal to the wavelength of the source
SNMP	Simple Network Management Protocol: a standard for monitoring network-attached devices
topology	logical layout of the parts of a computer system or network and their interconnections
transceiver	a transmitter/receiver module
transfer rate	the rate at which bytes or bits are transferred, as in megabytes or gigabits per second

Appendix B Accessories

The following Fibre Channel accessories are available through ATTO Technology and authorized resellers. Contact an ATTO Technology authorized sales representative to order.

Optical Cables

CBL-FCFI-05x5 m. cable – Duplex 50 Micron Multi-mode FC/Optical
CBL-LCSC-0033 m. 50/125 optical cable (LC to SC)
CBL-LCSC-01010 m. 50/125 optical cable (LC to SC)

A variety of iSCSI, Fibre Channel, SAS and SCSI products are also available from ATTO Technology. Please contact your ATTO sales representative for product descriptions and part number information.

Fibre Channel and iSCSI solutions

ATTO Celerity™ Family of Fibre Channel Host Adapters
ATTO FibreBridge™ – Fibre Channel-to-SCSI bridge
ATTO iPBridge – iSCSI to SCSI, iSCSI to Fibre Channel bridges

SCSI solutions

ATTO ExpressPCI Family of SCSI Host Adapters (see Appendix C)

SAS/SATA Solutions

ATTO ExpressSAS family of SAS Host and RAID Adapters (see Appendix C)

Software

ATTO ConfigTool – Configuration and management software
ATTO Express Power Center – Windows & Mac OS X RAID 0 and benchmark software

Appendix C ATTO Adapter Selection Guides

Contact your ATTO representative or visit the ATTO website for details on all ATTO products.

ExpressPCI SCSI host adapters

Product Features	Ultra 320 SCSI		
	UL5D	**UL5D LP**	**UL4D**
Max. transfer rate (MB/sec.)	640MB/s	640MB/s	640MB/s
Low Voltage Differential	•	•	•
Single-ended SCSI	•	•	•
Number of SCSI Channels (internal/external)	2/2	0/2	2/2
Number of SCSI IDs supported	30	30	30
Low profile		•	
Large file transfers	•	•	•
Cable distances (m)	12.5	12.5	12.5
32-bit PCI compatible			•
64-bit PCI compatible			•
33 MHZ PCI			•
133 MHZ PCI-X			•
66 MHz PCI			•
x4 PCI Express	•	•	
Windows 2000/XP, Vista Server 2003/2008 support	•	•	•
Linux support	•	•	•
Mac OS X support	•	•	•
Novell Netware support	•	•	•
RoHS compliant	•	•	•

ExpressSAS 6 Gb Host Adapters

Product Features	H6F0 GT	H6F0	H60F	H680	H608	H644
Max Data Rate	6Gb/s	6Gb/s	6Gb/s	6Gb/s	6Gb/s	6Gb/s
x8 PCI Express	•	•	•	•	•	•
Number of ports	16	16	16	8	8	8
Port configuration external/internal	16/0	16/0	0/16	8/0	0/8	4/4
Connector type	4 mini SAS (x4) SFF-8644 external	4 mini SAS (x4) SFF-8088 external	4 mini S AS (x4) SFF-8087 internal	2 mini SAS (x4) SFF-8088 external	2 mini SAS (x4) SFF-8087 internal	1 mini SAS (x4) SFF-8088 external 1 mini SAS (x4) SFF-8087 internal
Number of devices supported	2048 end-point devices	512 end-point devices	512 end-point devices	256 end-point devices	256 end-point devices	256 end-point devices
1.5 Gb SATA support	•	•	•	•	•	•
3 Gb SATA II support	•	•	•	•	•	•
3 Gb SAS support	•	•	•	•	•	•
6 Gb SATA II support	•	•	•	•	•	•
6 Gb SAS support	•	•	•	•	•	•
Software RAID	0	0	0	0	0	0
Cable distances	up to 8m SAS, 1m SATA	up to 8m SAS, 1m SATA	up to 8m SAS, 1m SATA	up to 8m SAS, 1m SATA	up to 8m SAS, 1m SATA	up to 8m SAS, 1m SATA
Advanced Data Streaming™	•	•	•	•	•	•
32-bit support	•	•	•	•	•	•
64-bit support	•	•	•	•	•	•
Windows	•	•	•	•	•	•
Linux	•	•	•	•	•	•
Mac OS X	•	•	•	•	•	•
VMware	•	•	•	•	•	•
Low profile	•	•	•	1/2 height	1/2 height	1/2 height

ExpressSAS 6 Gb RAID Adapters

Product Features	**R60F**	**R680**	**R608**	**R644**
Max Data Rate	6Gb/s	6Gb/s	6Gb/s	6Gb/s
x8 PCI Express	•	•	•	•
Number of ports	16	8	8	8
Port configuration external/internal	0/16	8/0	0/8	4/4
Connector type	4 mini SAS (x4) SFF-8087 internal	2 mini SAS (x4) SFF-8088 external	2 mini SAS (x4) SFF-8087 internal	1 mini SAS (x4) SFF-8088 external 1 mini SAS (x4) SFF-8087 internal
Number of devices supported	128 SAS/SATA targets	128 SAS/SATA targets	128 SAS/SATA targets	128 SAS/SATA targets
1.5 Gb SATA support	•	•	•	•
3 Gb SATA II support	•	•	•	•
3 Gb SAS support	•	•	•	•
6 Gb SATA II support	•	•	•	•
6 Gb SAS support	•	•	•	•
Software RAID	0, 40, 50, 60	0, 40, 50, 60	0, 40, 50, 60	0, 40, 50, 60
Integrated RAID	0, 1, 4, 5, 6 JBOD, DVRAID	0, 1, 4, 5, 6 JBOD, DVRAID	0, 1, 4, 5, 6 JBOD, DVRAID	0, 1, 4, 5, 6 JBOD, DVRAID
RAID Management Utility	•	•	•	•
Global Hot Spares	•	•	•	•
Event notification	E-mail, pop-up, log file	E-mail, pop-up, log file	E-mail, pop-up, log file	E-mail, pop-up, log file
SNMP	•	•	•	•
Memory (ECC)	512 MB	512 MB	512 MB	512 MB
Cable distances	up to 10m SAS, 1m SATA	up to 10 SAS, 1m SATA	up to 10m SAS, 1m SATA	up to 10m SAS, 1m SATA
Advanced Data Streaming™	•	•	•	•
32-bit support	•	•	•	•
64-bit support	•	•	•	•
Windows	•	•	•	•
Linux	•	•	•	•
Mac OS X	•	•	•	•
Low profile	•	•	•	•

Celerity 8-Gb Adapters

Product Features	FC-84EN	FC-82EN	FC-81EN
Fibre Channel Ports	4	2	1
FC protocol	8-Gb	8-Gb	8-Gb
Maximum Transfer Rate (Full Duplex)	6.4GB/s	3.2GB/s	1.6GB/s
Maximum Transfer Rate (Half Duplex)	3.2GB/s	1.6GB/s	800MB/s
Bus type	PCIe 2.0	PCIe 2.0	PCIe 2.0
Bus characteristics	8 lane	8 lane	4 lane
Optical interface	SFP+LC	SFP+LC	SFP+ LC
Maximum cable length	300m@2-Gb 150m@4-Gb 50m@8-Gb	300m@2-Gb 150m@4-Gb 50m@8-Gb	300m@2-Gb 150m@4-Gb 50m@8-Gb
Low profile form factor		✓	✓
Advanced Data Streaming (ADS™) Technology	✓	✓	✓
Software RAID support[1]	✓	✓	✓
Developer's kit (Target Mode & API)	✓	✓	✓
Windows support	✓	✓	✓
Linux driver support	✓	✓	✓
Macintosh OS X driver support	✓	✓	✓
VMware driver support	✓	✓	✓

1 ATTO Express Power Center recommended

Celerity 4-Gb Adapters

Product Features	FC-44ES	FC-42ES	FC-41ES	FC-41XS
Fibre Channel Ports	4	2	1	1
FC protocol	4-Gb	4-Gb	4-Gb	4-Gb
Maximum Transfer Rate (Full Duplex)	3.2GB/s	1.6GB/s	800MB/s	800MB/s
Maximum Transfer Rate (Half Duplex)	1.6GB/s	800MB/s	400MB/s	400MB/s
Bus type	PCIe	PCIe	PCIe	PCI-X
Bus characteristics	8 lane	4 lane	4 lane	64-bit 133 MHz[2]
Optical interface	SFP LC	SFP LC	SFP LC	SFP LC
Maximum cable length	300m@2-Gb 150m@4-Gb	300m@2-Gb 150m@4-Gb	300m@2-Gb 150m@4-Gb	300m@2-Gb 150m@4-Gb
Low profile form factor		✓	✓	✓
Advanced Data Streaming (ADS™) Technology	✓	✓	✓	✓
Software RAID support[1]	✓	✓	✓	✓
Developer's kit (Target Mode & API)	✓	✓	✓	✓
Windows support	✓	✓	✓	✓
Linux driver support	✓	✓	✓	✓
Macintosh OS X driver support	✓	✓	✓	✓
VMware ESX Server 3.5	✓	✓	✓	
Novell Netware	✓	✓	✓	✓
Solaris	✓	✓	✓	✓
Free BSD	✓	✓	✓	✓

1 ATTO Express Power Center recommended
2 Performance ceiling is constrained by bus transfer speed. Backward compatible to 32-bit and 33 MHz PCI

Appendix D Standards, Compliances: 10GbE CNA

The Technical Specification sheet for each FastFrame CNA lists certifications for that model. Models covered by this page include the FastFrame FFRM-CS11, FFRM-CS12, FFRM-CS14.

FCC standards: radio and television interference

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

Canadian standards

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

European standards

Declaration of Conformity

This following statement applies to the FastFrame CNA host adapter.

This device has been tested in the basic operating configuration and found to be compliant with the following European Union standards: Application of Council Directive: 2004/108/EC Standard(s) to which conformity is declared: EN55024:1998 +A1:2001 +A2:2003; EN55022:2006 +A1:2007 CLASS B.

This Declaration will only be valid when this product is used in conjunction with other CE approved devices and when the entire system is tested to the applicable CE standards and found to be compliant

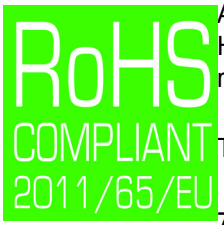
Japanese standards

この装置は、クラスＢ情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。　　ＶＣＣＩ－Ｂ

Voluntary Control Council for Interference by Information Technology Equipment (VCCI, Japan)

This is a Class B product based on the standard of the Voluntary Control Council for Interference from Information Technology Equipment (VCCI). If this is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual.

Compliances



ATTO FastFrame cards comply with Directive 2011/65/EU on the Restriction of the Use of Hazardous Substances in Electrical and Electronic Equipment (RoHS). Contact your ATTO representative regarding RoHS compliant products.

The FastFrame family of adapters take the following RoHS exemptions:

7(a) - Lead in high melting temperature type solders (i.e. lead based alloys containing 85% by weight or more lead).

7(c)-I - Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, (e.g. piezoelectronic devices, or in a glass or ceramic matrix compound).

7(c)-III - Lead in dielectric ceramic in capacitors for a rated voltage of less than 125 V AC or 250 V DC.

13(a) - Lead in white glasses used for optical applications.

15 - Lead in solders to complete a viable electrical connection between semiconductor die and carrier within integrated circuit flip chip packages.

Appendix E Safety, Warranty

All ATTO host adapter products have been tested to meet applicable safety standards when operated in proper electrical and thermal environments.

Safety

Please review the specifications for your specific host adapter before installing and operating it in any computer system to ensure compatibility.

Installation

Before installing an ATTO host adapter product into your computer system, unplug the computer from its electrical power source and allow adequate time for electrical discharge and the internal components to cool down before removing the computer system cover. This will decrease the risk of personal injury from electrical shock or touching the hot surface of an electrical component.

Once an ATTO host adapter is installed in a computer system, the computer cover must be reinstalled properly before turning the computer system back on.

Operation

ATTO host adapters require adequate cooling to function properly. If you have any questions as to the airflow provided by your computer system, please refer to your computer system manual or contact your computer system manufacturer.

To facilitate proper air circulation, ATTO host adapters should never be operated in a computer system without the cover installed or with an inoperable fan as this may cause safety or thermal problems which could damage the ATTO host adapter and void the warranty.

ATTO Technology, Inc. limited warranty

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